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THE TOMATO RUSSET MITE

By J. Wilcox and A. F. Howland

The tomato russet mite (Vasates lycopersici (Massee)) was first discovered in the United States in a hothouse at Modesto, Calif., in May 1940 (Keifer 4). About 500 acres of tomatoes were severely damaged in central California that year (Bailey and Keifer 1). By 1941 the mite had spread over most of the Sacramento and San Joaquin Valleys. In 1942 it appeared almost simultaneously throughout southern California and caused serious damage in fields where control measures were not promptly applied.

This mite has gradually spread over the rest of the country, but has caused alarm in the Eastern States only in the last 2 years. Its occurrence in the United States, according to the Insect Pest Survey and Cooperative Economic Insect Report and other sources, is as follows: 1940 California; 1943 Colorado; 1944 Arizona; 1946 Ohio; 1947 Utah; 1948 Nevada and New York; 1949 Oklahoma; 1950 Texas; 1952 Illinois, Massachusetts, Michigan, New Jersey, and Pennsylvania; 1953 Delaware, Georgia, Indiana, Iowa, and Maryland. In 1952 it was also found in Ontario, Canada.

The tomato russet mite is also a pest of tomatoes in Australia, New Zealand, Spain, Hawaii, Tasmania, and New Hebrides. In some of these places it has been known as the tomato mite (Morgan 10, Cottier and Taylor 2). It has been known by the scientific names Phyllocoptes lycopersici Masse (7) and Phyllocoptes destructor Keifer (4, 5), now recognized to be synonymous with Vasates lycopersici (Massee) (Lamb 6).

Host Plants

Tomatoes are the only cultivated plants seriously damaged by this pest. However, it also lives on petunia (Petunia hybrida), potato, nightshade (Solanum nigrum and villosum), tomatillo (Physalis ixocarpa), and Jimsonweed (Datura stramonium and ferox) in California, and on popolo (Solanum nodiflorum) in Hawaii (Bailey and Keifer 1).

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Description and Life Cycle

The adult mite is orange-yellow and wedge-shaped, and at the head, or larger, end has two pairs of legs. It is about 1/125 inch long, too small to be seen by the naked eye. A 20-power hand lens is needed to see these mites on the plants. The microscopic spherical eggs are white or translucent. The nymphs pass through two instars before they become adults. The second-instar nymphs are light yellow.

In the laboratory the mite's life cycle is completed in 7 days. The rapidity with which this mite reproduces explains why it occurs in countless numbers on the plants and why it can do so much damage. Because of its minute size, infestations are not usually detected until it has caused injury to the plants.

Injury

The mites feed on all the green parts of the plants--on the stems, the leaves, and the calyx--and in severe infestations also on the fruit. Their feeding gives the plants a bronze appearance. This discoloration is first noticed on the main stem at the ground level. As the infestation spreads [illegible] color continues up the main stem and out the branches. Severely injured leaves are a glossy brown on the upper surface.

Although individual tomato plants and entire fields have been destroyed by this pest, it is more common for the foliage in the central part of the plant to be killed or severely injured, the outer margins remaining green. This injury exposes the fruit to the sun's rays and it becomes unmarketable from sunburn.

Methods of Spread

These mites can be carried from field to field or for longer distances on young tomato plants. Injury has been observed in fields containing transplants that had been produced near older infested plantings. However, its rapid spread in southern California in 1942 cannot be explained by the shipment of tomato transplants from northern California, for only one field was found in which such transplants had been used. Since infestations developed in many southern California localities at the same time, it is believed that the interchange of boxes in which tomatoes were shipped from the Los Angeles market was largely responsible. When empty, these boxes are bought by second-hand box dealers and redistributed to tomato growers over a wide area. Parts of leaves, stems, or fruit calyxes infested with mites could easily be carried in these boxes.

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It is believed that the mite is at present so widely distributed in California on petunia, nightshade, and Jimsonweed that tomatoes cannot be safely grown in that State without the protection of insecticides. These native host plants live over winter in California and survive in protected locations even during periods of heavy frosts. Tomato fields cannot be isolated sufficiently to prevent infestation. It seems likely that the mites are spread by wind to tomato from these host plants. Tomato fields not treated with insecticides may not be seriously damaged every year, but they probably will be infested, and if the weather is favorable damage may occur every season.

Control

Sulfur dust is the standard remedy for the tomato russet mite. Experiments with various control methods have been reported by Bailey and Keifer (1), Hoerner (3), Michelbacher et al. (9), Wilcox and Elmore (12), and Wilcox and Howland (13). Recent laboratory tests (Tuft and Anderson 11) and field tests (Wilcox and Howland 14) indicate that a number of the new pesticides are effective.

The authors have obtained good control with 2-percent parathion, 2-percent EPN, 5-percent chlordane, 2.5-percent methyl parathion, and 20-percent toxaphene dusts. Limited tests indicate that these insecticides are also effective in sprays. However, since sulfur is effective and the other materials present greater hazards when used on tomatoes, none of them have been recommended for use against this mite.

Excellent control is obtained by dusting the plants with sulfur. Three applications are made 2 weeks apart, the first when the fruits of the main crop begin to set. A dust containing 50 percent of finely ground (325-mesh) dusting sulfur is used at 30 pounds per acre. It may be applied in mixtures that also contain 10 percent of either DDT or TDE for the control of the tomato fruitworm and other insects. A 25-percent sulfur dust is effective if this schedule is carefully followed. A sulfur dust of any strength can usually be applied to transplants without injury, but greater strengths may injure small plants less than 6 inches high. The tomato russet mite has also been controlled by the addition of 10 pounds of wettable sulfur per acre to sprays applied for control of other pests on tomatoes.

Sulfur residues must be completely removed before the tomatoes are canned. In California sulfur dust was first used on tomatoes with considerable caution, as some canners prohibited its use and others only permitted 25-percent sulfur to be used. In 1943 the canning companies had evidence that in ordinary tin cans 1 to 2 p.p.m. of sulfur caused bluish iridescent streaks in the tin, at 5 p.p.m. bluish streaks were observed in the tin and hydrogen sulfide odor, and at 15 to 20 p.p.m.

there was a general black discoloration with a more noticeable hydrogen sulfide odor and an off-flavor. However, the canners found that with plenty of water in the washing process 25- and 50-percent sulfur dusts were easily removed from the tomatoes. As it became evident that production would be curtailed by russet mite infestation if sulfur was not used, the canners doubled the size of their washers. At the present time there is no restriction on the amount or strength of sulfur that can be used on tomatoes for processing in California.

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